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An Assessment of the Comprehensibility of a New Driver Education Course for Use in Ontario Secondary Schools

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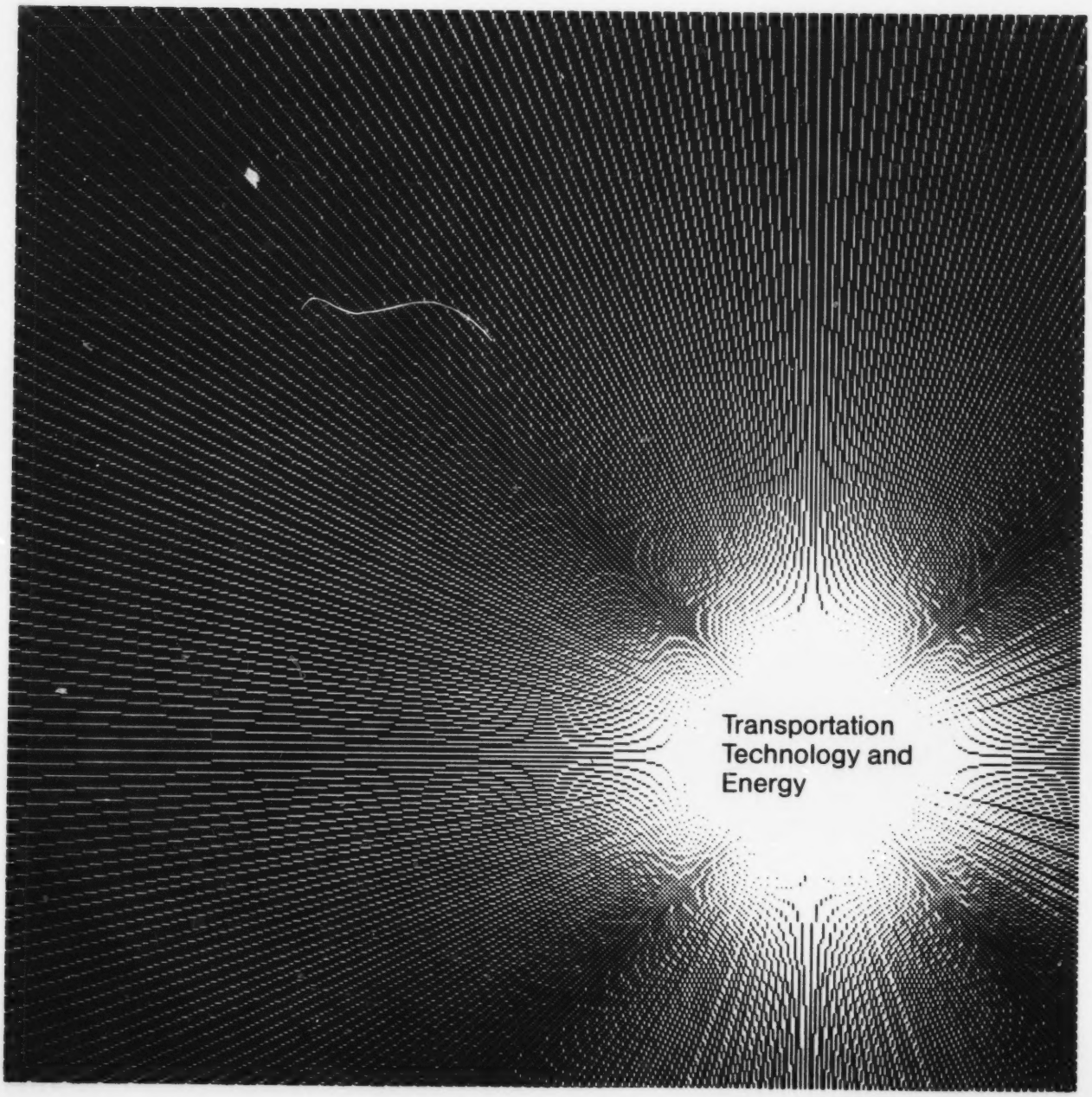

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An Assessment of the Comprehensibility of a New Driver Education Course for Use in Ontario Secondary Schools

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Abstract:
The Ministry of Transportation and Communications has developed a new course for driver education for use in Ontario schools. Before the introduction of the new course, an assessment of the comprehensibility of the course materials (student text and two teachers' manuals) has been undertaken to assure that the materials are readable. The assessment provides both an overall evaluation of the comprehensibility of the materials for their intended readers and detailed section by section results to guide possible editorial improvements.

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EXECUTIVE SUMMARY

Background and Objectives

The Ministry of Transportation and Communications has developed a new course for driver education for use in Ontario schools. Before the introduction of the new course, an assessment of the comprehensibility of the course materials (student text and two teachers' manuals) has been undertaken to assure that the materials are readable. The assessment provides both an overall evaluation of the comprehensibility of the materials for their intended readers and detailed, section by section results to guide possible editorial improvements.

The research strategy for making the assessment is a "cloze test survey" based on samples of passages from the materials and given to samples of the target reader populations. A standard "cloze" test is constructed from a text sample by replacing every fifth word by a blank space of a fixed size. Readers are asked to deduce and fill in the missing words. The tests are scored by counting correct replacement of the deleted words. The criterion level of performance is about 35% for marginal comprehension and 50% for good comprehension. The cloze test results can be linked to linguistic counts (word size, sentence size) made on the same passages and to standard reading test scores, where available, for the same readers. These linkages improve the accuracy and generalizability of the comprehensibility assessment.

Student Data Collection and Results

For the student textbook, 22 passages were sampled and converted to cloze tests. The cloze tests were administered together with a brief questionnaire and a standardized reading comprehension test to a sample of students drawn from three Ontario school boards. Each student was assigned 2 cloze tests at random. The final analysis sample, after data cleaning and collation, contained 1,161 students, of whom 662 were currently enrolled in a driver education course and 499 were not.

For the average student in the sample, most passages proved to be easy to comprehend, and no passages were found to be difficult. When the results were linked to the reading test scores, it was found that for the poorer readers, virtually all the passages still exceeded the 35% criterion for marginal comprehension. For the good readers, the passages were very easy. Further analyses and summarizations showed that the comprehensibility of the various chapters and sections of the textbook was uniformly high. The overall estimated cloze performance was 43% for poor readers, 51% for average readers, and 59% for good readers.

Teacher Data Collection and Results

For each of the teacher manuals, a sample of 12 passages were prepared as cloze tests. Cooperation was obtained from 27 school boards in distributing survey materials to in-car and in-class teachers. The response rate from the teachers was about 75%. The final samples comprised 146 in-class teachers and 162 in-car teachers. Each teacher was asked to fill out a brief questionnaire and to respond to 4 cloze tests. The tests were assigned randomly.

The results were similar for the in-class and the in-car passages and responses. Most of the passages proved to be easy or very easy (50% cloze or higher) for most of the teachers. A few passages were of moderate comprehensibility for most teachers, but even these seemed difficult (less than 35% cloze) for only a small fraction of the teachers. The data were summarized to the level of each part of the manuals and to the total manuals, and the comprehensibility was found to be uniformly high. The overall cloze means were 59% for the in-car manual and 56% for the in-class manual.

Conclusions

The student textbook, the in-class manual, and the in-car manual proved to be very comprehensible for their student and teacher target readers. It is recommended that any further editorial work can focus on other aspects, such as the liveliness of the style and the technical correctness of the content.

1/ INTRODUCTION

The Ministry of Transportation and Communications has developed a new course for driver education for use in Ontario schools. The new course is seen as remedying a number of substantive deficiencies in the old course, "Power Under Control".

Production of a new course is a major undertaking affecting thousands of students who will use the course, and therefore has major cost and impact implications. So before the introduction of the new course, an assessment of the comprehensibility of the course materials (student text and two teachers' manuals) has been undertaken.

The assessment provides both an overall evaluation of the comprehensibility of the materials for their intended readers and detailed, section by section results to guide possible editorial improvements.

2/ METHODOLOGY

2.1/ Definition of Comprehensibility

The comprehension of written material--that is, the successful transmittal of information--depends on: (a) the linguistic complexity of the materials; (b) the complexity of the content of the materials; (c) the linguistic ability of the reader; and (d) the knowledge by the reader of the content. The act of comprehension of literacy can occur when there is an appropriate matching of these factors.

A reader will find material more comprehensible and will more easily obtain information from the material if: (a) the writing of the material is simpler and more direct; (b) the information in the material is less dense and more common; (c) the reader has good language skill; and (d) the reader has good general knowledge of the content presented in the material.

Because comprehensibility depends on the combination of these four factors, the assessment has to be carried out in the particular context of the use of the materials by the target readers--that is, the teachers and students of the driver education course.

The content of the textbook and manuals is determined by the educational purposes of the driver education course. The language abilities and general knowledge of the readers are determined prior to and outside the scope of the driver education course. The key remaining factor is the appropriateness of the language complexity of the materials. So the immediate focus of the assessment of comprehensibilty is on language complexity.

For further discussion of this perspective on reading comprehension surveys, and for detailed references, see Kirkwood and Wolfe (1980).

2.2/ Research Strategy

The research problem is specific and concrete. How comprehensible are the materials of the new course for the students and teachers who will need to use them? The question is asked as an overall evaluation and also in detail, for purposes of editorial improvement.

The only practical way to answer the research question is to test out samples of the materials on students and teachers from the (potential) target populations. That is, the target readers, with their particular linguistic and content backgrounds, need to interact with the materials, and we need to observe and measure their reaction.

2.3/ Cloze Methodology

A standard "cloze" test is constructed from a text sample by replacing every fifth word by a space of a fixed size. Readers are asked to deduce and fill in the missing words. In scoring the results, exact replacements are counted as correct.

It is a well established result in the field of research on reading that cloze test scores are accurate and robust measures of comprehension. The criterion level of performance is about 35% for marginal comprehension and 50% for good comprehension.

Cloze testing provides an excellent methodology for comprehensibility assessments. Cloze tests are constructed mechanically and without elaborate development from passages selected from the materials to be assessed. The tests are administered to readers sampled from the target population. The results are tabulated according to the criterion levels to give the specific comprehensibility of the passage from which each cloze test was constructed. The passage by passage percentages are averaged to obtain the overall comprehensibility of the materials.

2.4/ Cloze Test Surveys

The only important limitations of the cloze methodology are the costs of sampling passages and sampling potential readers. To obtain an accurate assessment of a textbook or manual, one needs to use a reasonably large sample of passages, if there is any substantial variability in comprehensibility between and within the parts of the books. And for each cloze test, one needs a reasonably large sample of readers to take the test, especially since individual differences in reading ability are notoriously large.

Responding to a cloze test for a 200 word passage takes a high school student or adult about 10-15 minutes. From practical considerations, therefore, a given sampled reader can take perhaps three or four cloze tests in one session (e.g., a class period).

An appropriate data collection strategy given this constraint is to sample readers and passages simultaneously--that is, to administer samples of cloze tests to samples of potential readers, so that each reader responds to just a small number of tests, but for each passage we have a large, random subsample of respondents. (This procedure is called "multiple matrix" sampling.)

2.5/ Cross-Calibration with Reading Test Scores

In the case of the students and student textbook, it has been possible in this assessment to go beyond the standard cloze survey methodology. Each student took a standardized reading comprehension test in addition to responding to two of the textbook-based cloze tests. The cloze test results can be calibrated to the reading test scales.

One advantage of doing this is purely technical. Each cloze test is taken by a different subsample of students. Although the subsamples are random, they are relatively small and subject to sampling error. Differences between the subsamples can be minimized by statistical adjustment, considering the reading test scores of the students. This simply makes the cloze test tabulations more accurate. (This is a form of "regression estimation".)

A second advantage is that the cloze test results can be re-expressed in terms of the test score norms. This allows extrapolation of the results beyond the limitations of the survey sample and puts the results in the form of numbers that refer to characteristics of the target population of students. In particular, estimates can be provided for the comprehensibilty of the materials for students with low, average, and high reading ability.

2.6/ Cross-Calibration with Linguistic Variables

Both the student and teacher materials were available in machine-readable form. It was feasible therefore to construct the standard word and sentence size averages for the full texts as well as for the passages sampled for cloze test construction. These are the standard linguistic variables often used in readability formulas.

Average word size and average sentence size are "indicators" of comprehensibility. It would be dangerous to base a complete comprehensibility analysis on such variables. In the first place, they are based on "surface" characteristics of the material and are very subject to editorial manipulation without deeper effect. That is, making short sentences or using short words do not in themselves guarantee easier material. Second, no universal formula anchors the linguistic variables to the specific comprehensibility of these kinds of materials for these kinds of readers.

However, in the context of the cloze survey, linguistic variables can be statistically related to the cloze test results on the sampled passages, providing a kind of "local" readability formula. This can be used to improve the cloze survey results, through a process of regression estimation. First, a prediction formula for cloze test mean is developed. This formula is developed by examining correlations between the linguistic variables and cloze tests for the same passages. Second, the formula is applied to the variables as calculated for the full texts of the sections and chapters of the materials. This smooths out the roughness in the sampling of the particular passages chosen for cloze testing.

2.7/ Alternative Methodologies

The various aspects of the methodology were chosen to provide accurate assessments of readability at a reasonable cost. For purposes of completeness, and to anticipate questions, we should consider why some alternative methodologies were rejected.

Standard readability formulas, (e.g., Dale-Chall, Flesch, Spache) are based just on linguistic variables (word and sentence counts) and would simply not have provided credible results. The materials have been heavily edited and such factors as vocabulary and sentence length have been carefully controlled. Analysis of the standard formulas could be "fooled" by such material, if these were not supplemented by additional information. Also, the target reader populations (students and teachers in driver education courses) are very specific, and no existing formula can be assumed to refer to them.

The cloze test methodology is accepted among educational researchers, but may seem somewhat arcane to others. A more obvious approach would be to use knowledge-testing questions, asked of students and teachers before and after attempted use of the materials. This could be done with paper and pencil testing or with direct interviews. The problem with such approaches is purely economic: The test construction times or the test administration times are so long and costly that only a small fraction of the textual material could be included in the survey.

There are some occasionally used variations on the cloze test procedure. In our survey, we scored as correct only the exact replacement for a deleted word. Sometimes, an attempt is made to score synonyms. This is much more time-consuming. In a testing program, when individual scores are important, accepting synonyms might be a requirement for sake of fairness. But in a pure survey, the only effect would be to add expense and systematically raise the score means. Of course, we would have to raise the criterion levels as well, and the net effect on interpretation would be zero. Multiple-choice cloze tests are another possibilty, but this requires an elaborate test construction process to define the alternatives. Also the scale characteristics are uncertain.

3/ ANALYSIS OF THE STUDENT TEXTBOOK

3.1/ Sampling passages

The student textbook contains nine chapters. Each chapter contains regular, continuous text and special, boxed material. For the cloze survey, 32 passages of about 200 words each were sampled from the textbook.

All the regular text was considered for sampling and analysis. Each chapter was divided for purposes of sampling into three parts--beginning, middle, and end--dividing at a section or subsection to get approximately equal thirds. From each part of each chapter, 1 passage was sampled, by choosing a point at random in the text, moving back to the beginning of a paragraph, or further if necessary to pick up necessary context, and then going forward to the first full stop after the 200th word. Fewer words were taken if a major topic change was encountered. This way, a total of 9 x 3 = 27 passages were sampled from the regular text.

Of the boxed material identified as appropriate for the study (newspaper quotations, for example, were omitted), 5 passages of about 200 words were sampled, using the same randomization procedures as with the regular text.

From each of the 32 sampled passages, 2 alternate cloze test forms were constructed, the first by starting deletion with the seventh word, the second by starting deletion with the ninth word. Half the testings were done with the first form and half with the second. All the analytic results were obtained by averaging the data for the two forms.

3.2/ Sampling Students

The student sample came from three Ontario school boards: Peel, Middlesex, and Grey. No claim is made, of course, that the sample is statistically representative of the student population. Rather, it was chosen for convenience and to contain some of the important variability of the population (e.g., rural/urban, north/central, drivers/non-

drivers). The statistical accuracy of the results is obtained through the adjustment for reading test scores (see Section 2.5 above).

In the Middlesex and Grey boards, students enrolled in driver education were sampled, while in the Peel board, both students enrolled in driver education and students in the same grade but not taking driver education were sampled.

The size of the total sample for cloze testing was 1,313 students. As well, reading test information was obtained for 1,203 students.

The final sample for the analysis--that is, students with useable cloze test data and useable reading test data--comprised 1,161 students, however, and it is this smaller sample on which most analyses are based. (Most of the missing data was due to reading test data not being available for about 100 students in the non-driver education part of the Peel Board sample. The other losses were due to miscoded ID's, incomplete tests, etc.)

The components of the analysis sample are as follows:

499	Peel County Board non-driver education students
544	Peel County Board driver education students
36	Middlesex County driver education students
82	Grey County driver education students
1,161	Total

From a questionnaire given with the tests, we find that most (83%) of the driver education students reported that they had a Class L license. Most (90%) of the non-driver education students reported that they had no driver's license and few (7%) reported that they had taken or were taking driving lessons (either at high school or outside). We will see later (Section 3.7) that the driver education students found the material slightly easier.

Overall, 16% of the students did not have English as a first (mother) language, and half of these (8%) reported that English was not the language spoken mostly at home. While these figures describe the nature of the sample of students, and therefore of the corresponding populations, the sample sizes are too small to permit differentiation of the reading results by this background variable.

3.3/ Field Administration

The field administration was carried out by staff from the participating school boards, who conducted this data collection on contract to SPR Associates.

Each student filled out a one-page questionnaire concerning possible driver's licenses, high school or other driver education courses, and English as a first or predominant language.

The reading comprehension test of the Gates-MacGinitie Survey F, Form 1M was administered. This consists of 52 multiple-choice cloze items over 21 short passages and is designed for grades 10-12 students. Students marked their responses on cards for optical scanning.

Each student was given a short practice cloze test, with the answers, and then took 2 of the 64 cloze tests constructed from the student textbook. The assignment of cloze tests to student was random, with rotation to ensure that the 2 tests were from different parts of the textbook and that all tests were distributed uniformly throughout the sample.

The administration took somewhat less than 60 minutes in total.

The reading test cards were scanned and scored by machine, and the cloze tests were scored by hand (with exact replacement or spelling variations only counted as correct) and keyed and verified.

3.4/ Cloze Survey Results

The detailed results of the cloze survey are given in Table 1, where each line corresponds to one of the 32 sampled passages, as identified in column (A).

The most basic result is the raw cloze median, given in column (F). This is the median percentage of replaced words over the sample of students who took the passage as a cloze test. (The sample size is about 35 for each alternate form, or 70 for each passage.) A standard interpretation of the cloze test scale is:

> 35% represents marginal comprehensibility; beginning at this level, a reader can use the material independently for gaining information; anything less and the reader would require substantial extra input to understand the material;
>
> 50% represents good comprehension; anything beyond this level and the material is easy to understand and use;
>
> Note that the 35-50% zone represents material that is useable but not easy.

It is striking that most of the cloze test medians are at or above 50%. That is, the material is easy for the majority of the sampled students. There are a few exceptions (e.g., passage 4a and 8c) where the material is quite hard for half the students. But for textbook material, the overall assessment is that the material is easy.

The other columns in Table 1 re-express the basic cloze results through regression comparison with the reading test scores. The mechanism for the comparison is a robust analysis carried out for each passage, regressing the cloze test scores on the reading test scores. The regression coefficients are given in columns (B) and (C).

One form of re-expression is to estimate the cloze test level corresponding to key points on the reading test scale. That is, we ask what reading comprehension is expected for poor, average, and good

readers. The results are given in columns (G), (H), and (I). The three reading ability levels are defined in terms of the test score scale as 17, 27, and 37 points. According to the test manual, these points correspond roughly to the 20th, 50th, and 80th percentiles among students toward the end of grade 10.

Reading Ability Levels

	Poor Readers	**Average Readers**	**Good Readers**
Reading Score	17	27	37
Reading Percentile	20th	50th	80th

These correspond closely to the percentiles in our sample. For example, passage 1b from the text is estimated to be just barely comprehensible (cloze = 35.1) to the poor readers, moderate (46.1) for the average reader, and very easy (57.1) for the good readers.

The reexpression in the reading score metric serves two purposes. First, by estimating the comprehension performance of students at different parts of the reading test scale, we obtain a picture of the variabilty of performance to be expected across the student population. Second, we are in effect correcting for chance differences in the reading abilities of the students in the samples for the different passages; this is a form of regression estimation or covariance adjustment.

Throughout, we will identify the three levels or groups as "poor readers", "average readers", and "good readers".

It is striking that the estimates for the poor readers are still quite reasonable: few passages seem to present real problems.

Another form of reexpression is given in columns (D) and (E). Here the questions are turned around to: what test score level do we estimate is required to obtain marginal (35%) or good (50%) comprehension. For example, with passage 1b, it is estimated that a reading test score of 16.9 is needed to get marginal comprehension, and a test score of 30.5 is needed to get good comprehension.

It is striking that for most passages, a very low level of reading ability is sufficient to obtain marginal comprehension, and very good comprehension is usually obtained at or below an average score level.

In summary, nearly all the text seems easy for the great majority of the target students.

3.5/ Cloze Survey Summaries

Since the passages were randomly selected from the boxes and from the chapter texts, the cloze test data can be weighted and averaged to obtain summary estimates of difficulty. The weights are based on the number of words in the boxes and in the thirds of each chapter.

The results are given in Table 2. The form of expression is parallel to columns (G), (H), and (I) in Table 1. That is, we estimate the cloze test score for poor, average, and good readers.

It is striking that no chapter is overly difficult even for the poor readers. Chapter 3 is seen to be somewhat easier, and Chapters 4 and 6 seem somewhat harder. The overall assessment, from the total line of the table, is that the textbook is very easy for good readers, easy for average readers, and moderate for poor readers.

3.6/ Linguistic Formula Analysis

Further regression analyses were carried out, connecting the student response data to linguistic variables that were calculated from the computerized texts for the sampled passages.

In particular, two variables:

- o average word size = letters per word, and
- o average sentence size = words per sentence

were calculated for each passage. Word size is a conventional indicator of vocabulary complexity, and sentence size is a conventional indicator of syntactic complexity.

The sample size for this regression was just 32, since the passage is the unit of analysis. A kind of robust, three step regression process was needed. The first step was to run six robust regressions, each using as dependent variable the estimated cloze test corresponding to one of the reading test score groups ("poor", "average", or "good") from column G, H or I of Table 1, and using one of the two linguistic variables. Second, the ratios of the regression coefficients for word size and sentence size were calculated and found to have an average of about 15. Third, a composite equal to 15 times word size plus sentence size was computed and the three dependent variables were regressed on that, yielding the following formulas:

For poor readers,	the expected cloze score for a person with a reading score of 17 = 70.9 - .339 x composite
For average readers,	the expected cloze score for a person with a reading score of 27 = 82.1 - .379 x composite
For good readers,	the expected cloze score for a person with a reading score of 37 = 93.3 - .419 x composite

For example, if a text has an average word size of 5.1 and an average sentence size of 22.2, the composite is 5.1 x 15 + 22.2 = 98.7, and for an average student, with a reading score of 27, we would anticipate a cloze score of 82.1 - .379 x 98.7 = 44.7, or somewhat less than easy comprehension.

One application of the formulas is to improve the estimates for overall comprehensibilty. The cloze survey results for the sampled passages are combined with formula estimations for the remaining, unsampled text to yield the chapter and overall estimates presented in Table 3. This table is parallel to Table 2, except we can suppose that the estimates are somewhat more accurate and stable, since fluctuations introduced by chance in selecting the passages for the cloze survey will be smoothed out. The apparent variablity between chapters does, in fact, seem to be reduced.

A second application of the formulas is to provide a finer-grain look at the comprehensibility of the textbook. In Tables 4 and 5, the readability formulas are applied to each box and to each section of the text. We see no glaring areas of difficulty or inordinate easiness. The material seems to be uniformly easy.

3.7/ Ancilliary Variables

The reading test scores provide the principal reference for the cloze survey, allowing extrapolation to the distribution of reading abilities in the target population. It is for this reason that the non-random selection of the student sample is not considered a problem.

An important ancilliary variable is whether a student is currently enrolled in a driver education course, since such a student might have a relative advantage in comprehending the materials. The student might be more familiar with the specialized vocabulary, for example. Enrolment in a driver education course was included as a sampling stratification. Its effect was tested by including it as an independent, dummy variable in a special run of the passage regressions of cloze test score on reading test score. The result was that while the students sampled from driver education courses scored about 1.5% higher on cloze, adjusted for reading test score, this difference was not statistically significant.

4/ ANALYSIS OF THE IN-CLASS AND IN-CAR TEACHER MANUALS

4.1/ Sampling Passages

The in-class manual consists of an introduction, of about 1,700 words, followed by the lessons, with about 41,000 words. For purpose of the cloze test comprehensibility survey, 12 passages were randomly chosen: 2 from the introduction and 10 from the lessons, with stratification among the lessons, to ensure that each general topic was included.

The method of picking the passages was similar to that used with the student textbook, as described earlier. A point is picked at random in the text, and we move back to the beginning of a paragraph, or farther if necessary to pick up context, then we go forward to the first full stop after the 200th word. A shorter passage is taken if a context shift is encountered.

The in-car manual contains a general introduction, with about 2,700 words, a specific, 200-word introduction to the procedures and manoeuvres, about 4,700 words of explanation of the procedures and manoeuvres, a 200-word introduction to the charts and forms, the charts and forms themselves, and about 3,700 words of summary of the student textbook. For purposes of the cloze test comphrehensibility survey, 12 passages were chosen: 2 from the general instructions, 1 from the specific introduction to the procedures and manoeuvres, 6 from the procedures and manoeuvres, 1 from the introduction to the charts and forms, and 2 from the student textbook summaries.

The 12 passages for each manual were converted to cloze tests in a single form each, with the first deletion at the seventh word of text.

4.2/ Sampling Teachers

To carry out the comprehensibility survey, it was necessary to have, for each of the manuals, a sample of the target teachers respond to the cloze tests. That is, in-class teachers would have to take the cloze tests for the in-class manual, and in-car teachers would have to take the cloze tests for the in-car manual.

The two samples were selected and drawn in a single operation. The information available was the number of driver education students, in-class teachers, and in-car teachers by school board in Ontario. This information was provided by the Ministry from an earlier study. From the data, a random sampling order was constructed, with priority in sampling given proportionally according to number of driver education students. Also, three Northern Ontario school boards were given special priority to ensure representation of that area.

The school boards in the top part of the list were notified by the Ministry of their probable selection. There was then telephone contact with the school board director and with the person he or she indicated as the coordinator for participation. The coordinator was usually the driver education program coordinator for the board. That person provided up-to-date information about the number of in-class and in-car teachers and made arrangements to have the survey carried out.

School boards were taken from the priority sampling list in order until the sampling quotas of 200 teachers of each kind were reached. (The quota of 200 was adopted with the expectation that 150 completed questionnnaires would be received.) In the end, 27 boards participated in the survey.

4.3/ Field Administration

The survey instruments for the teachers consisted of a cover letter, a one-page questionnaire concerning teaching experience and language, an example cloze test, and then 4 actual cloze tests. The tests were assigned to instruments randomly, with stratification to ensure that each teacher got four tests from different parts of the manual, and with rotation to ensure that the various tests were uniformly distributed across the sample. The instruments for in-class teachers and in-car teachers were differentiated by colour.

Packages of instruments were sent to the school board coordinators by courier. At the board, different methods were used to distribute and collect the instruments. In some cases, they were mailed or transmitted by board courier. In other cases, the coordinator visited the teachers. In a few cases, the information was collected in connection with a meeting of the teachers.

The instruments were returned to the research centre by courier, checked, coded, and scored, and the data were keyed and verified. In scoring the cloze tests, only exact replacements and spelling variations were accepted as correct. The total sample sizes were: 146 in-class teachers, and 162 in-car teachers.

For the teacher survey, no reading test score information was available.

4.4/ Characteristics of the Samples

From the tabulation of questionnaire items answered by the teachers, we obtain the following picture of the respondents.

About 20% of the in-car teachers are certified public or high school teachers. Of the in-class teachers, 88% are certified public or high school teachers.

About 53% of the in-car teachers indicated that they were contracted by a commercial driving school. Of the in-class teachers, 12% were.

The average number of years of experience in teaching in the respective areas (in-class or in-car) was about 9. There was no significant difference in amount of experience between the two kinds of teachers. About 25% of teachers had 3 fewer years of experience, and another 25% had more than 12 years of experience.

Among the in-car teachers, 20% did not have English as a first (mother) language, while the corresponding figure for in-class teachers was 10%. This is a statistically significant difference.

While these figures describe the nature of the samples of teachers, and therefore of the corresponding populations, the sample sizes are too small to permit differentiation of the reading results by the background variables.

4.5/ Cloze Test Distributions

The distributions of the cloze test scores for the in-class passages are given in Table 6. For the in-car passages, the distributions are given in Table 10. The sample size per passage is about 45 for in-class and 50 for in-car.

The distributions are shown with boxplots. In each case, the box itself covers the middle half of the observations--that is, of the teachers cloze test scores. The "+" marks the median score. The dashed lines leading out from the box extend to the "normal" yet more extreme scores. The "*"s mark possible outliers.

With a few exceptions, the boxes are on or above the 50% cloze line. This means that for more than half, perhaps three-quarters, of the teachers, the passages are easy to comprehend. In a few cases, notably passages 2b and 2c in the in-class manual and passage 1b in the in-car manual, the box is below the 50% cloze line, but even in those cases, it is above the 35% cloze line. This means that even the less easy passages do not present major difficulty for most (three-quarters) of the teachers.

The corresponding numerical results are given in Tables 7 and 11. Here we see precisely the proportion of teachers in the sample whose scores fell below the 35% minimal comprehensibility level, the proportion in the moderate 35-50% range, and the proportion with scores above 50%, for whom the passage is easily comprehended. With only 2 exceptions in each sample, the passages were easy for the majority of the teachers.

4.6/ Comprehensibility Summary Estimates

In Tables 8 and 12 the cloze test results are aggregated to the main parts and to the total of the manuals. This is done by two methods, which agree in their message: the manuals are uniformly comprehensible to the teachers.

One method is simply to average the cloze test results from the sampled passages, weighting as appropriate by the number of words in the parts from which the passages were sampled. This method yields estimated percentages of teachers who would attain the 35% or 50% criterion level of cloze--that is, who would find the material difficult or easy. It also yields an estimated mean cloze, indicated as version (a).

The second method involved the use of linguistic counts. As with the student textbook, the full text of the manuals was available in computerized form, so for both the sampled passages and for the rest of the full text, the standard linguistic counts of average word size and average sentence size could be calculated.

The results as regards sentence size were inconsistent, with low correlations and a number of outlier observations. A likely explanation is that the manuals contain a high proportion of lists rather than continuous discourse, so the sentence counts would be inaccurate indicators of syntactic complexity. It was decided to abandon sentence size as a variable.

Another approach was to use word frequency counts as a refined measure of vocabulary difficulty. Complete word lists were constructed by section and for the total of each manual, and then counts of the proportion of common words in each cloze test passage was correlated with cloze test performance. The results were apparently redundant with average word size.

So finally, it was decided to use just word size as the independent variable in the cloze test on linguistic variable regressions. Also it was decided to pool the in-class and in-car regression, since there was no statistically significant difference between them, but to fit different intercepts. The readability formulas were found to be as follows:

Cloze (in-class) = 110.0 - 10.5 x word size, and
Cloze (in-car) = 107.2 - 10.5 x word size.

An immediate application was to refine the summary comprehensibility estimation by applying the formulas to the unsampled parts of the texts. This yields the versions labelled (b) of the cloze test means in Tables 8 and 12. Very little improvement is evident in the estimates, indicating that the text is linguistically uniform.

4.7/ Detailed Comprehensibility Estimates

The readability formulas were also applied to each section and lesson of the manuals. The results are given in Tables 9 and 13. Only a few sections show less than a 50% (easy) average for the teachers. The manuals are uniformly easy.

5/ CONCLUSIONS

The major finding in this study is that for the student textbook,for the in-class manual, and for the in-car manual, the comprehensibility of the textual material is quite appropriate for the respective audiences--students, in-class teachers, and in-car teachers. The overall level of comprehensibilty is high. There seem no identifiable areas or points in the text that present real difficulty for any substantial fraction of the target reader populations. The comprehensibiity is very uniform over the sections, chapters, and lessons of the materials.

Any editorial attention to comprehensibility should be focused on the parts of the materials estimated to have lower comprehensibility--that is, lower cloze test score averages as presented in the tables of this report.

Is the material "too easy"? The danger of very easy material is that readers may find it boring, too long, and patronizing. There certainly seems to be room, within acceptable limits for comprehensibility, to make parts of the material more concise and perhaps livelier. At this point in the development of the materials, that can be a matter of stylistic editing.

An informal and unexpected result of the teacher survey was that a number of teachers took the opportunity while answering the cloze tests to make comments and take issue with some of the content being presented. Of course, the teachers were missing every fifth word (and were substituting them correctly back at a rate of about 55%), so they may have missed important parts of the information. Yet if this signals us that <u>any</u> substantive errors remain in the texts, then it may be desirable to have some further review of the substance of the materials, by a panel of teachers (in spite of the fact that this has already been done at least once). Alternatively, if the comments do not identify errors, this may indicate need for training of teachers on the materials when they are introduced.

In summary, there seem to be virtually no problems requiring attention as regards the comprehensibility of these driver education materials. It is recommended that the final stages of editing be devoted to making the language perhaps more concise and lively and to assure that the technical content is correct.

TABLE 1

RESULTS OF THE CLOZE TEST SURVEY FOR THE STUDENT TEXTBOOK

(A) Student Textbook Sampled Passage	(B) Regression of cloze on reading test a	(C) b	(D) Estimated reading score to reach cloze 35%	(E) 50%	(F) Raw Cloze Median	(G) Estimated cloze score for three Reader Groups: Poor	(H) Average	(I) Good
Box 1	34.1	.61	1.5	25.9	50.0	44.5	50.7	56.8
Box 2	28.9	.92	6.7	22.9	55.4	44.5	53.8	63.0
Box 3	29.6	.87	6.2	23.5	51.3	44.3	53.0	61.7
Box 4	32.2	.79	3.6	22.6	50.0	45.6	53.5	61.4
Box 5	27.5	.89	8.4	25.3	50.0	42.6	51.6	60.5
Text 1a	35.5	.65	-0.8	22.2	52.6	46.6	53.1	59.7
Text 1b	16.5	1.10	16.9	30.5	47.0	35.1	46.1	57.1
Text 1c	26.1	.82	10.8	29.1	49.3	40.1	48.3	56.5
Text 2a	20.2	.90	16.5	33.2	43.1	35.4	44.4	53.4
Text 2b	44.5	.58	-16.2	9.5	58.3	54.4	60.2	66.1
Text 2c	40.2	.77	-6.8	12.7	60.0	53.3	61.0	68.7
Text 3a	46.1	.56	-19.8	7.0	60.0	55.6	61.2	66.7
Text 3b	40.6	.63	-8.8	14.9	55.9	51.3	57.6	63.9
Text 3c	24.9	1.06	9.6	23.7	57.4	42.9	53.4	64.0
Text 4a	21.2	.57	24.1	50.3	36.3	30.9	36.6	42.4
Text 4b	31.2	.81	4.7	23.2	54.9	45.0	53.1	61.2
Text 4c	31.3	.78	4.7	24.0	53.7	44.6	52.4	60.1
Text 5a	21.3	.88	15.5	32.5	47.4	36.3	45.1	53.9
Text 5b	31.9	.79	3.9	22.8	51.3	45.4	53.3	61.3
Text 5c	34.0	.83	1.2	19.3	55.3	48.1	56.4	64.7
Text 6a	18.1	.95	17.8	33.6	41.3	34.2	43.7	53.2
Text 6b	23.5	1.08	10.6	24.5	57.7	41.9	52.6	63.4
Text 6c	25.8	.72	12.7	33.5	44.4	38.1	45.3	52.5
Text 7a	30.9	.55	7.4	34.6	45.6	40.3	45.8	51.3
Text 7b	20.7	.98	14.6	29.9	48.2	37.4	47.2	57.0
Text 7c	28.1	.77	8.9	28.5	49.3	41.2	48.9	56.5
Text 8a	41.2	.77	-8.1	11.3	59.8	54.4	62.1	69.9
Text 8b	33.5	.53	2.9	31.2	47.0	42.5	47.8	53.1
Text 8c	21.5	.71	19.0	40.1	37.0	33.6	40.7	47.8
Text 9a	30.9	.68	6.1	28.0	48.1	42.5	49.3	56.2
Text 9b	36.8	.54	-3.4	24.2	50.0	46.1	51.5	57.0
Text 9c	17.5	1.30	13.4	24.9	57.1	39.7	52.7	65.8

Note: See the report for the detailed definition of the columns of this table. Each row corresponds to a passage sampled from a different part of the student textbook. Columns (G)-(I) show estimates of cloze test performance for poor, average, and good readers. Few passages show low comprehension (35% cloze) even for poor readers. Most passages are easy (50% cloze) for average readers and very easy for good readers.

TABLE 2

SUMMARY ESTIMATES OF COMPREHENSIBILITY FOR THE STUDENT TEXTBOOK, BASED ON THE CLOZE TEST SURVEY

Student Textbook	Estimated Cloze Performance for three reader groups: Poor	Average	Good
Boxes	44.3	52.5	60.7
Chapter 1	40.9	49.5	58.0
Chapter 2	48.4	55.8	63.4
Chapter 3	50.0	57.4	64.9
Chapter 4	39.3	46.4	53.5
Chapter 5	43.8	52.1	60.4
Chapter 6	38.1	47.3	56.5
Chapter 7	40.0	47.5	55.1
Chapter 8	43.9	50.7	57.5
Chapter 9	42.4	51.5	60.8
Total	43.1	51.0	58.9

Note: These estimates are based on the cloze survey results, adjusted by the reading test scores, and weighted by the number of words in the boxes and in each third of each chapter, from which the cloze passages were taken.

The columns correspond to poor, average, and good readers. A cloze test level of 35% is considered to mean marginal comprehension and a level of 50% to mean good performance. Chapter 3 seems to be somewhat easier, and Chapters 4 and 6 seem to be somewhat harder. But no part of the textbook is identified as too hard or too easy.

TABLE 3

SUMMARY ESTIMATES OF COMPREHENSIBILITY FOR THE STUDENT TEXTBOOK, BASED ON THE CLOZE TEST SURVEY AND ADJUSTED USING LINGUISTIC COUNTS FROM THE FULL TEXT

Student Textbook	Estimated Cloze Performance for reading score		
	Poor	Average	Good
Boxes	43.8	51.8	59.8
Chapter 1	41.3	49.2	57.0
Chapter 2	44.0	52.0	59.9
Chapter 3	44.8	52.8	60.8
Chapter 4	42.5	50.3	58.1
Chapter 5	43.6	51.7	59.8
Chapter 6	43.4	51.6	59.7
Chapter 7	42.6	50.5	58.3
Chapter 8	42.8	50.6	58.4
Chapter 9	43.5	51.5	59.5
Total	43.2	51.1	59.1

Note: These estimates are based on the cloze survey results, adjusted by the reading test scores, and extrapolated by the regressions on linguistic counts to the full text. This a smoothed refinement of Table 2. As there, the columns correspond to poor, average, and good readers. A cloze test level of 35% is considered to mean marginal comprehension and a level of 50% to mean good performance. The comprehensibility seems to be very uniform over the full text.

TABLE 4

DETAILED ESTIMATES OF COMPREHENSIBILITY OF THE STUDENT TEXTBOOK BOXES

Student Textbook Box	Number of words	Estimated cloze score for three reading levels: Poor	Average	Good
Box 1:1	449	42.4	50.3	58.1
Box 1:2	321	39.4	46.9	54.4
Box 1:3	510	41.5		
Box 2:1	234	41.5	49.2	57.0
Box 2:3	118	44.1	52.1	60.2
Box 2:4	680	43.4	51.3	59.3
Box 2:5	496	41.5	49.2	57.0
Box 3:1	233	42.3	50.1	58.0
Box 3:2	357	41.4	49.1	56.8
Box 3:3	175	47.1	55.4	63.8
Box 4:1	343	41.4	49.2	56.9
Box 5:2	226	42.8	50.7	58.5
Box 6:2	104	40.5	48.1	55.8
Box 6:3	95	43.4	51.4	59.3
Box 6:5	250	41.8	49.5	57.3
Box 6:6	294	45.6	53.8	62.0
Box 7:1	170	35.6	42.7	49.7
Box 7:5	383	43.5	51.5	59.4
Box 8:1	244	44.2	52.2	60.3
Box 8:6	175	46.8	55.1	63.5
Box 8:7	277	46.6	55.0	63.3
Box 9:2	859	46.3	54.6	62.9
Box 9:3	508	45.4	53.6	61.8

Note: These estimates are calculated from the readability formulas using linguistic count data. The formulas were calibrated using the cloze survey data and the reading test scores. The cloze score estimates are for poor, average and good readers.

TABLE 5

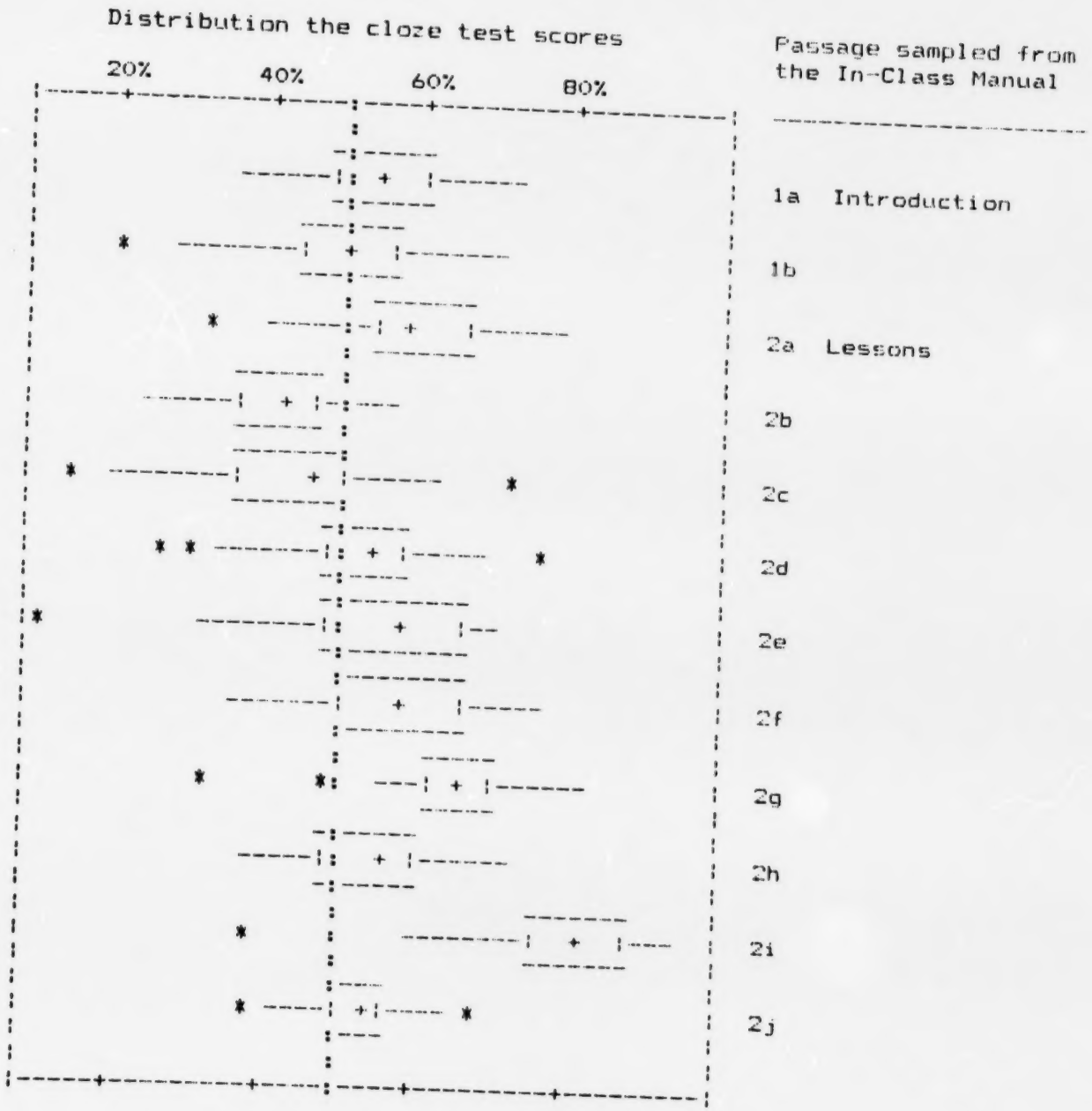
DETAILED ESTIMATES OF COMPREHENSIBILITY OF THE STUDENT TEXTBOOK CHAPTER SECTIONS

Student Textbook Section	Number of words	Estimated cloze score for three reading levels: Poor	Average	Good
Chapter 1.1	362	42.8	50.6	58.5
Chapter 1.2	1166	40.8	48.5	56.1
Chapter 1.3	1359	42.0	49.8	57.6
Chapter 1.4	628	41.9	49.7	57.4
Chapter 1.5	243	38.7	46.0	53.4
Chapter 2.1	312	40.2	47.7	55.3
Chapter 2.2	2874	43.6	51.6	59.6
Chapter 2.3	741	43.6	51.5	59.5
Chapter 2.4	960	44.7	52.8	61.0
Chapter 2.5	366	44.5	52.6	60.7
Chapter 3.1	1023	42.6	50.5	58.4
Chapter 3.2	646	44.0	52.1	60.1
Chapter 3.3	608	44.0	52.0	60.0
Chapter 3.4	1075	44.0	52.0	60.0
Chapter 3.5	1452	45.1	53.3	61.5
Chapter 3.6	1283	45.7	53.9	62.2
Chapter 4.1	2986	43.1	51.0	58.9
Chapter 4.2	537	43.3	51.3	59.2
Chapter 4.3	1283	41.3	49.0	56.8
Chapter 4.4	1344	42.3	50.1	57.9
Chapter 5.1	195	40.8	48.5	56.1
Chapter 5.2	887	44.4	52.5	60.6
Chapter 5.3	1141	42.5	50.3	58.2
Chapter 5.4	576	45.7	53.9	62.1
Chapter 5.5	1058	44.7	52.8	60.9
Chapter 6.1	355	43.7	51.7	59.7
Chapter 6.2	1642	44.5	52.6	60.7
Chapter 6.3	2068	44.1	52.2	60.2
Chapter 6.4	954	43.7	51.7	59.7
Chapter 6.5	1041	43.5	51.4	59.4
Chapter 7.1	334	41.4	49.1	56.9
Chapter 7.2	1682	42.9	50.8	58.7
Chapter 7.3	669	42.1	49.9	57.7
Chapter 7.4	1081	44.1	52.1	60.1
Chapter 7.5	1107	44.6	52.7	60.8
Chapter 7.6	1939	41.5	49.2	56.9
Chapter 8.1	2399	42.4	50.2	58.0
Chapter 8.2	1967	44.6	52.7	60.8
Chapter 8.3	1318	41.4	49.1	56.8
Chapter 8.4	587	42.0	49.8	57.6
Chapter 8.5	259	40.4	48.1	55.7
Chapter 9.1	285	41.0	48.7	56.4
Chapter 9.2	1058	43.1	51.0	58.9
Chapter 9.3	1813	44.7	52.8	60.9
Chapter 9.4	1544	43.3	51.2	59.1
Chapter 9.5	942	43.5	51.5	59.5
Chapter 9.6	85	40.9	48.5	56.2

Note: These estimates are calculated from the readability formulas using linguistic count data. The formulas were calibrated using the cloze survey data and the reading test scores. The cloze score estimates are for poor, average and good readers.

TABLE 6

BOXPLOTS OF THE CLOZE TEST DISTRIBUTION BY PASSAGE FOR THE SURVEY OF THE IN-CLASS MANUAL



Note: The boxplots show the distribution of the cloze test scores: the "+" marks the median score, the box itself covers the middle half of the scores, the dashed lines extend to the more extreme scores, and the "*"s mark possible outliers. The interpretation of the cloze score scales is that 50% and above indicates good, easy comprehension; 35% or below indicates inappropriate comprehensibility for independent use of the material.

TABLE 7

RESULTS OF THE CLOZE TEST SURVEY FOR THE IN-CLASS MANUAL

In-Class Manual Part	Sample	Number of words	Average word size	Median Cloze Score	Percent Meeting Cloze Criteria -35	35-50	50+
Introduction							
	1a	217	5.6	57.1	-	20.8	79.2
	1b	167	5.5	53.1	11.1	24.4	64.4
Lessons							
	2a	207	5.0	61.0	1.9	9.4	88.7
	2b	199	5.0	43.6	13.7	66.7	19.6
	2c	128	5.2	47.8	18.0	36.0	46.0
	2d	153	5.0	57.1	4.2	12.5	83.3
	2e	202	4.5	60.0	2.1	18.8	79.2
	2f	190	4.8	59.5	-	12.5	87.5
	2g	143	4.3	69.2	2.0	-	98.0
	2h	218	4.3	58.1	-	20.8	79.2
	2i	169	4.3	84.4	-	2.3	97.7
	2j	143	4.7	55.6	-	21.6	78.4

Note: Each row corresponds to one passage sampled from the In-Class manual. The cloze test scores indicate the comprehensibility of the passages. Generally speaking, a level of 50% or more indicates good, easy comprehension. A level of 35% or less indicates difficulty in making independent use of the material. None of the passages are difficult for very many teachers; most are easy for the majority of the teachers.

TABLE 8

SUMMARY ESTIMATES OF COMPREHENSIBILITY FOR THE IN-CLASS MANUAL

In-Class Manual Part	Number of words	Average word size	Estimated Cloze Mean (a)	Estimated Cloze Mean (b)	Percent meeting Cloze Criteria -35	35-50	50+
Introduction	1,739	5.4	55.1	54.5	5.6	22.6	71.8
Lessons	41,088	4.8	59.6	59.3	4.2	20.1	75.8
TOTAL	42,827	4.8	59.4	59.1	4.2	20.1	75.6

Note: The estimated cloze mean (a) is calculated from the results of the cloze survey, weighted by the number of words from the parts from which the passages were sampled. The estimated mean (b) is further adjusted by extrapolation of the cloze survey results to the unsampled text by means of regression on word size. The overall assessment is that the Manual is easily comprehended by the teachers.

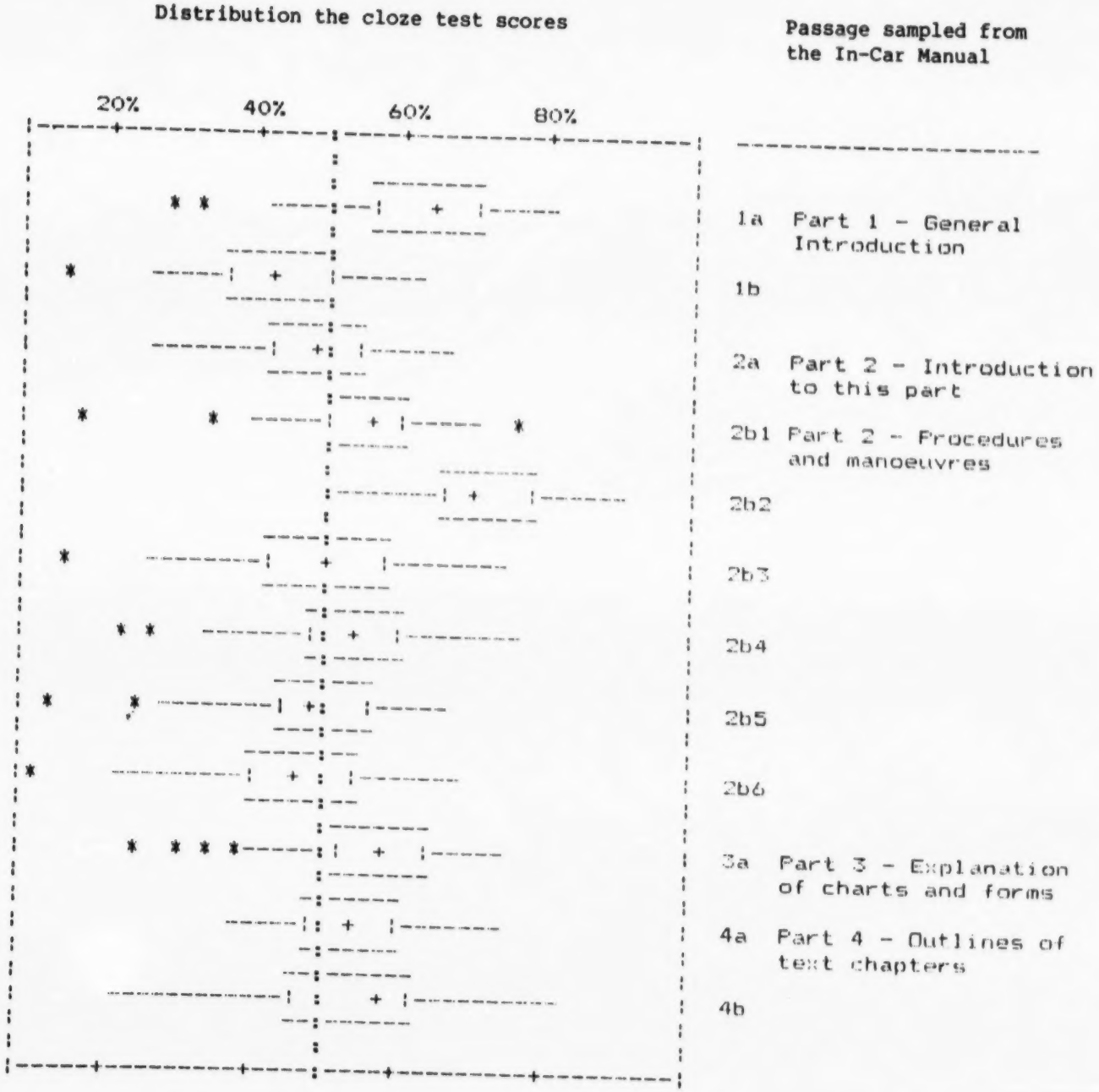
TABLE 9

DETAILED ESTIMATES OF COMPREHENSIBILITY OF THE SECTIONS OF THE IN-CLASS MANUAL

Number of Words	Estimated Cloze Difficulty	Part and Section of the In-Class Manual
1739	53.8	INTRODUCTION
254	55.5	LESSONS 1, 2, 3
812	57.4	LESSON 1
2176	57.8	LESSON 2
1106	58.7	LESSON 3
124	60.1	LESSONS 4 AND 5
1419	59.1	LESSON 4
955	59.7	LESSON 5
109	56.2	LESSONS 6, 7, AND 8
1179	59.4	LESSON 6
559	58.9	LESSON 7
1000	61.9	LESSON 8
235	60.3	LESSONS 9, 10, 11, 12
1674	56.9	LESSON 9
931	59.3	LESSON 10
1403	56.9	LESSON 11
1444	57.0	LESSON 12
147	54.9	LESSONS 13 AND 14
1034	56.4	LESSON 13
1532	61.0	LESSON 14
78	56.4	LESSONS 15 THROUGH 19
893	61.3	LESSON 15
1746	60.9	LESSON 16
2176	61.9	LESSON 17
1315	58.3	LESSON 18
1607	60.2	LESSON 19
54	62.2	LESSONS 20 AND 21
1880	59.3	LESSON 20
1829	61.3	LESSON 21
100	54.5	LESSONS 22 THROUGH 27
1535	62.5	LESSON 22
1308	60.1	LESSON 23
2580	58.1	LESSONS 24, 25, AND 26
1557	58.2	LESSON 27
96	54.5	LESSONS 28, 29, AND 30
1726	60.8	LESSON 28
1388	59.7	LESSON 29
1127	60.2	LESSON 30

Note: These estimates are calculated from a readability formula based on word size. The formula was calibrated using the cloze survey data. Virtually all sections are easy.

TABLE 10
BOXPLOTS OF THE CLOZE TEST DISTRIBUTION BY PASSAGE FOR THE SURVEY OF THE IN-CAR MANUAL



Note: The boxplots show the distribution of the cloze test scores: the "+" marks the median score, the box itself covers the middle half of the scores, the dashed lines extend to the more extreme scores, and the "*"s mark possible outliers. The interpretation of the cloze score scales is that 50% and above indicates good, easy comprehension; 35% or below indicates inappropriate comprehensibility for independent use of the material.

TABLE 11

RESULTS OF THE CLOZE TEST SURVEY FOR THE IN-CAR MANUAL

In-Car Manual Part	Sample	Number of words	Average word size	Median Cloze Score	Percent meeting Cloze Criteria -35	35-50	50+
Part 1 - General Introduction	1a	151	4.9	65.5	3.8	5.7	90.6
	1b	186	5.5	44.4	16.3	42.9	40.8
Part 2 - Introduction to this Part	2a	211	5.4	51.2	3.9	35.3	60.8
Part 2 - Procedures and Manoeuvres	2b1	188	4.8	58.3	1.8	14.3	83.9
	2b2	194	4.7	73.0	-	-	100.0
	2b3	130	4.7	52.0	9.3	37.0	53.7
	2b4	192	4.5	55.6	3.6	20.0	76.4
	2b5	138	4.4	50.0	9.3	24.1	66.7
	2b6	112	4.8	47.6	14.8	46.3	38.9
Part 3 - Explanation of charts & forms	3a	194	4.5	60.5	3.6	5.5	90.9
Part 4 - Outlines of text chapters	4a	161	5.3	56.7	-	11.8	88.2
	4b	197	4.5	59.5	6.4	25.5	68.1

Note: Each row corresponds to one passage sampled from the In-Car manual. The cloze test scores indicate the comprehensibility of the passages. Generally speaking, a level of 50% or more indicates good, easy comprehension. A level of 35% or less indicates difficulty in making independent use of the material. None of the passages are difficult for very many teachers; most are easy for the majority of the teachers.

TABLE 12

SUMMARY ESTIMATES OF COMPREHENSIBILITY FOR THE IN-CAR MANUAL

In-Car Manual Part	Number of words	Average word size	Estimated Cloze Mean (a)	(b)	Percent meeting cloze criteria -35	35-50	50+
Part 1 - General Introduction	2776	5.0	55.0	54.5	10.1	24.2	65.7
Part 2 - Introduction to this Part	220	5.4	51.2	51.2	3.9	35.3	60.8
Part 2 - Procedures and Manoeuvres	4745	4.8	56.1	56.9	6.5	23.6	69.9
Part 3 - Explanation of charts & forms	199	4.6	60.5	60.5	3.6	5.5	90.9
Part 4 - Outlines of text chapters	3730	4.6	58.1	58.7	3.2	18.6	78.2
TOTAL	11670	4.8	56.4	56.9	6.2	22.1	71.7

Note: The estimated cloze mean (a) is calculated from the results of the cloze survey, weighted by the number of words from the parts from which the passages were sampled. The estimated mean (b) is further adjusted by extrapolation of the cloze survey results to the unsampled text by means of regression on word size. The overall assessment is that the Manual is easily comprehended by the teachers.

TABLE 13

DETAILED ESTIMATES OF COMPREHENSIBILITY OF THE SECTIONS OF THE IN-CAR MANUAL

Number of Words	Estimated Cloze Difficulty	Part and Section of the In-Car Manual	
2776	54.4	PART 1:	INTRODUCTION
220	50.1	PART 2:	DRIVING PROCEDURES AND MANOEUVRES
472	58.6	PART 2.1:	PRE-DRIVING CHECKS
134	51.6	PART 2.2:	CONTROL DEVICES
128	55.3	PART 2.3:	ACCESSORIES AND GAUGES
87	56.3	PART 2.4:	STARTING AND STOPPING THE ENGINE
225	59.0	PART 2.5:	DRIVING FORWARD: AUTOMATIC TRANSMISSION
218	57.0	PART 2.6:	DRIVING FORWARD: MANUAL TRANSMISSION
240	57.0	PART 2.7:	CHANGING LANES
162	54.3	PART 2.8:	PROCEEDING THROUGH INTERSECTIONS
112	54.4	PART 2.9:	RIGHT TURNS
173	56.0	PART 2.10:	LEFT TURNS
131	56.9	PART 2.11:	BACKING
60	49.4	PART 2.12:	BACKING THE CAR INTO THE STREET
212	57.8	PART 2.13:	U-TURNS
106	55.0	PART 2.14:	TWO-POINT TURNS
49	49.3	PART 2.15:	THREE-POINT TURNS
201	60.2	PART 2.16:	ANGLE PARKING
208	58.4	PART 2.17:	PERPENDICULAR PARKING
271	58.3	PART 2.18:	PARALLEL PARKING
79	59.4	PART 2.19:	PARKING ON A HILL
125	52.7	PART 2.20:	SPECIAL CITY VEHICLES AND AREAS
123	62.0	PART 2.21:	ENTERING A FREEWAY
72	59.1	PART 2.22:	DRIVING ALONG ON A FREEWAY
141	61.2	PART 2.23:	EXITING FROM A FREEWAY
212	59.2	PART 2.24:	HIGHWAY CURVES AND SHOULDERS
361	58.0	PART 2.25:	PASSING ON A TWO-LANE HIGHWAY
91	51.0	PART 2.26:	COUNTRY ROADS
114	56.5	PART 2.27:	RAILWAY CROSSINGS
113	55.6	PART 2.28:	DRIVING AT NIGHT
40	45.8	PART 2.29:	DRIVING IN INCLEMENT WEATHER
85	56.9	PART 2.30:	GETTING FUEL
199	58.8	PART 3:	OBSERVATION CHARTS AND EVALUATION FORMS
453	55.1	PART 4:	Chapter 1: Becoming a Responsible Driver
161	51.6	PART 4:	Chapter 2: Getting To Know Your Car
620	59.8	PART 4:	Chapter 3: Manoeuvring Your Car
437	57.0	PART 4:	Chapter 4: Driving in the City
257	60.5	PART 4:	Chapter 5: Driving on the Freeway
326	61.1	PART 4:	Chapter 6: Driving on Highways & Country Roads
512	61.2	PART 4:	Chapter 7: Driving at Night and in Bad Weather
602	59.4	PART 4:	Chapter 8: Reducing Accidents and Injuries
362	59.4	PART 4:	Chapter 9: Maintaining Your Car

Note: These estimates are calculated from a readability formula based on word size. The formula was calibrated using the cloze survey data. Virtually all the sections are easy.

APPENDIX A/

LETTERS, INSTRUCTIONS, AND QUESTIONNAIRES

A.1/ Ministry Letter to Boards of Education

A.2/ Letter to Boards of Education from the Consultant (Social Policy Research Associates)

A.3/ Ministry Letter to Teachers

A.4/ Teacher's Instructions and Questionnaire

A.5/ Student's Instructions and Questionnaire

A.1/ Ministry Letter to Boards of Education

Ontario

Ministry of
Transportation and
Communications

Safety Coordination & Development Office
2nd Floor, West Building
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8

October 19, 1983

As you may be aware, this Ministry has been involved for the past few years in developing a new driver education course for use in Ontario secondary schools. We have had many teachers from both the high schools and commercial sector review the course and assist in revisions.

We now have a final draft of the student textbook, and the classroom and in-car instructors' manuals. As the last stage of work, we will be testing the comprehensibility of the materials using groups of teachers and students.

We will be contacting a number of boards in the next few days for possible participation in the study. Your board is one that is being considered for participation in the part of the study which evaluates the instructors' manuals. We would very much appreciate it if the driver education classroom teachers and in-car instructors from the participating boards read short passages taken from the manuals and respond to accompanying questions. This should require no more than one hour of their time and can be completed privately by each instructor, although in some cases it might be convenient to make use of a group meeting if one is scheduled. We would appreciate it if the driver education coordinators of the participating boards assist us in the distribution and collection of the passages and questions.

The consulting firm of Social Policy Research Associates has been hired to design and analyze the comprehensibility tests. A representative from this firm will be contacting you in the next few days to discuss participation in the study. If you have any questions about any aspect of this work, please call the Ministry Project Manager, Linda Clifford, at (416) 248-3807.

Yours sincerely,

Ed Blake
Administrator
Transportation Safety

A.2/ Letter to Boards of Education from the Consultant (Social Policy Research Associates)

Social Policy Research Associates

495 Queen St. East, Toronto, Ontario M5A 1V1 (416) 862-1404
2212, Chemin des Foulons, Sillery, Québec G1T 1X4

November 2, 1983

Dear :

As you probably know, the Ministry of Transportation and Communications has been working for the last several years on the design of a new curriculum for the driver education course used in Ontario secondary schools. The course is designed to improve driver education. It addresses 34 areas not covered in the old course. A classroom teacher's manual, an in-car instructor's manual, and a student textbook have been developed as curriculum resources for the new course.

At this time, the Ministry needs to evaluate the comprehensibility of the manuals and textbook. (By "comprehensibility", we mean the ease with which the materials can be read and understood.) Our consulting firm has been engaged to carry out a field survey of samples of the materials, using the "cloze" procedure. (In the cloze procedure, systematic deletions are made from samples of the target text, and potential readers try to guess the deleted words. By tabulating the percentage of correct replacement, we get a good measure of how readable the text is for those readers.)

As indicated in the letter your Board received from Mr. Ed Blake of the Ministry, the driver education instructors in your Board of Education have, together with those in other boards around Ontario, been selected for the field testing of the teacher materials. This will involve less than an hour of their time. They will find the task interesting, and they will be helping us make these materials as useful and understandable as possible.

Each of the enclosed envelopes contains the questionnaire for one driver education teacher, together with instructions and an envelope for returning the completed questionnaire to you.

Note that separate envelopes are provided for in-class and in-car instructors. By in-car we mean those who do only in-car instruction. Each questionnaire is different. For your information we are enclosing a sample.

If possible, we hope that you can arrange for your instructors to complete the questionnaires in a single, one-hour group meeting. If that is not feasible, then please:

- open each envelope and fill in the instructor's name on the return envelope, so you know who has responded;
- distribute the envelopes and arrange for their completion and return to you.

A.2/ Letter to Boards of Education from the Consultant (Social Policy Research Associates) (con't)

Please note that the envelopes with each completed questionnaire are to be opened only at our research office, as we have promised teachers that their results on the test are confidential.

As soon as all the envelopes are ready, please return them to us by Purolator in the large return envelope we have provided. We hope that we can receive all responses by November 15 or shortly thereafter. We are very grateful for the cooperation of your driver education instructors and, especially, for your willingness to coordinate this work.

Sincerely yours,

Caroline Hunt
Survey Director

PS. If you have any questions, please call either me at (416) 862-1404 or Linda Clifford, Ministry of Transportation and Communications, (416) 248-3807.

A.3/ Ministry Letter to Teachers

Ministry of
Transportation and
Communications

Transportation Technology
and Energy Branch
Room 333, Central Building
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8

November 2, 1983

Dear Driver Education Instructor:

The Ministry of Transportation and Communications has been working for the last several years on the design of a new curriculum for the driver education course used in Ontario secondary schools. The course is designed to improve driver education. It addresses 34 areas not covered in the old course. A classroom teacher's manual, an in-car instructor's manual, and a student textbook have been developed as curriculum resources for the new course. Many teachers from both the high schools and commercial sector have reviewed the course and assisted in revisions.

At this time, the Ministry needs to evaluate the comprehensibility of the manuals and textbook. A consulting firm, Social Policy Research Associates, has been engaged to carry out a field survey of samples of the materials.

The driver education instructors in your Board of Education, and in other boards sampled around Ontario, have been selected for the field testing of the teacher materials. This will involve less than an hour of your time. You will find the task interesting, and you will be helping us make these materials as useful and understandable as possible for you and your fellow driver education instructors.

Accompanying this letter you will find the questionnaire that we would like you to answer, together with instructions. Please use the enclosed addressed envelope to return your completed questionnaire.

> Please set aside <u>one hour</u> for this task in the next couple of days.

> Please complete and return this as soon as possible. We're hoping to have all the responses from the director/-coordinator of your Board by November 15.

Thank you for your cooperation and assistance. If you have any questions, please call either your Board's coordinator for the project (as named on the envelope) or Linda Clifford, Ministry of Transportation and Communications (416) 248-3807.

Yours sincerely,

A. G. Stermac
Director

Enclosed/

A.4/ Teacher's Instructions and Questionnaire

ONTARIO MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

DRIVER EDUCATION TEACHER MANUAL COMPREHENSIBILITY STUDY

Thank you for your cooperation and assistance in this important study of comprehensibility of the draft teacher manuals for the new driver education course.

FIRST. Please answer the following three questions.

A. Check the appropriate box(es) which apply to you.
- ( ) Certified public or high school teacher
- ( ) In-car instructor contracted by a commercial driving school
- ( ) Classroom instructor contracted by a commercial driving school
- ( ) Other (Please specify) _____

B. How many years have you been teaching driver education?

____Classroom portion ____In-car portion

C. Check the appropriate boxes that apply to you.

( ) Yes ( ) No English is my first (mother) language.
( ) Yes ( ) No English is the language I speak mostly at home.

SECOND. Please use the following instructions to fill out the next five pages. (The first page is an example.)

Each page contains a specially prepared extract from the new driver education manual. Every fifth word has been left out. Your task is to guess what word was left out and then to write that word in the blank space.

- Only one word can be written in each blank
- Do not be afraid to guess
- Try to fill in every blank
- Skip over hard blanks and then come back to them when you have finished.

Please spend 5-10 minutes on each page and no more than one hour for the task as a whole. Do not ask anyone to help you. Do not consult any texts or other materials.

THIRD. Please put the completed questionnaire into the envelope, seal the envelope, and return it to contact person named on the envelope. Note that your responses will be treated confidentially, and the envelope will be opened only by the research consultants.

For your information and interest, asking potential readers of a text to fill in deleted words is called the "cloze" procedure and is a proven method for measuring comprehensibility or readability. We will tabulate the percentage of correct replacement, over the several hundred instructors participating in this study, and this will give us clear indication of the comprehensibility of the material and specific direction for final editing of the manuals.

EXAMPLE. The first blank has been filled in. Try to guess the others. (Cover up the bottom half of the page!)

THE CAR IN CANADIAN SOCIETY

Over the last 20 years, the number of cars *in* Canada more than doubled _____ 4 million to 10 million. Clearly _____ car has a very _____ place in our society. _____ to imagine what your _____ would be like if _____ were no cars or _____ or trucks. It would _____ be very different from _____ way you live today.

ANSWERS. Here are the answers. No one is likely to get them all exactly correct.

1. in 2. from 3. the 4. big 5. try 6. life
7. there 8. buses 9. probably 10. the

A.5/ Student's Instructions and Questionnaire

ONTARIO MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

DRIVER EDUCATION STUDENT TEXTBOOK COMPREHENSIBILITY STUDY

1. This survey is aimed at evaluating and improving the comprehensibility (readability) of a new textbook being prepared for the driver education course given in Ontario secondary schools. Your cooperation will make an important contribution to the editing of the textbook.

2. The answer cards are for the Gates-MacGinitie Reading Test. Please write both the above number code and the letter code on the back of each card.

3. On the FIRST card (the one asking for "name"):

   - mark the number code by filling the corresponding ovals in the first three columns on the left.
   - mark the letter code by filling the corresponding ovals below the numbers.

4. Also, please mark the ovals for:

   - your sex
   - your grade
   - your group (the test administrator will tell you what code to use)

5. When you are told to begin, please read carefully and answer the questions from the COMPREHENSION section of the test, which starts on page 6 of the Gates-MacGinitie Reading Test. Mark your answers on the SECOND card, items 1 to 52. (Please do not work in the test booklet.)

6. When you are told to continue, please fill out the rest of this Driver Education Questionnaire.

ONTARIO MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

DRIVER EDUCATION STUDENT TEXTBOOK COMPREHENSIBILITY STUDY

Thank you for your cooperation and assistance in this important study of comprehensibility (readability) of a new driver education textbook.

FIRST. Please answer the following questions.

A. Do you have any of the following types of licenses? (Please check all the statements that apply to you.)

( ) I don't have any license
( ) I have a Class G (car) license
( ) I have a Class M (motorcycle) license
( ) I have a Class L (car learner's) license
( ) I have a Class R (motorcycle learner's) license
( ) I have another kind of license (Please list the kind of license you have: _____)

B. Have you taken or are you currently enrolled in any of the following kinds of driver education courses?

( ) High school driver education course
( ) A formal course not offered through a high school
( ) I have taken no formal course in driver education

C. Please check the appropriate boxes which apply to you.

( ) Yes ( ) No English is my first (mother) language
( ) Yes ( ) No English is the language I speak mostly at home.

SECOND. Please use the following instructions to fill out the next three pages. (The page after this page is an example.)

1. Each page contains a specially prepared extract from the new driver education textbook. Every fifth word has been left out.

2. Your task is to guess what word was left out and then to write that word in the blank space.

   - o Only one word can be written in each blank
   - o Do not be afraid to guess
   - o Try to fill in every blank
   - o Skip over hard blanks and then come back to them when you have finished

Your answers will help us learn how easy the new textbook is to read and where more editing is needed.

A.5/ Student's Instructions and Questionnaire (con't)

EXAMPLE. The first blank has been filled in. Try to guess the others. (Cover up the bottom half of the page!)

TRAFFIC LAWS

All drivers want to reach *their* _____ destinations quickly and without _____. But because there are _____ many motor vehicles and _____ many kilometres of roads _____ which they can travel, _____ are bound to be _____. Therefore, it is necessary _____ have rules and regulations _____ make sure our roads _____ both efficient and safe.

ANSWERS. Here are the answers. No one is likely to get them all exactly correct.

1. their	2. trouble	3. so	4. so	5. on
6. there	7. conflicts	8. to	9. to	10. are

APPENDIX B/

SAMPLE CLOZE TESTS

B.1/ Sample Teacher's Cloze Tests

B.2/ Sample Student's Cloze Tests

[225]

SPECIAL HAZARDS

Hills and mountains

Discuss briefly the problems a driver _____ encounter on hilly roads. _____ the proper procedures for _____ up and down steep _____ and mountains.

Hazards associated with country roads and highways

Get students _____ list the hazards associated _____ country roads and highways. _____ them to describe the _____ that each hazard can _____ to a driver, and _____ safest way to deal _____ these hazards. Fill in _____ details wherever necessary.

Point _____ that many drivers who _____ in cities and large _____ get little experience driving _____ country roads. They might _____ camping once a year _____ drive out to buy _____ vegetables once in a _____ from a farmer. Occasional _____ drivers should take extra _____ because they are unfamiliar _____ the local roads and _____ special problems which they _____ present.

Other road users

Review the laws _____ to school buses. Describe _____ hazards that they present. _____ the need for extra _____ when following or approaching _____.

Review the hazards presented _____ trucks and slow-moving vehicles. _____ the students with the _____ situation.

- You have been _____ along a gravel road _____ about 50 km/h and come _____ the top of a _____. Suddenly....

[227]

SEAT BELTS

Facts about seat belts

Start the discussion by asking how _____ in the class know _____ seat belts are required _____ law in their province. _____ are they required or _____ not? Point out the _____ that in may provinces _____ and car passengers must _____ wear seat belts by _____. Despite some complaining when _____ law was introduced, most _____ do buckle up. A _____ majority of drivers approve _____ the seat belt laws.

_____ the fact that thousands _____ people are killed each _____ in car crashes because _____ did not wear their _____ belts. Their chances of _____ alive or of only _____ minor injuries in a _____ would have been much _____ if they had been _____ a seat belt. You _____ wish to illustrate this _____ with the statistics in _____ lesson content.

"The human collsion"

Explain that _____ crashes occur in a _____ accident. One is when _____ car hits something, and _____ other when a person _____ some part of the _____ of the car. Describe _____ seat belts can prevent _____ from striking the interior _____ being thrown out of _____ car in a crash. _____ the concept of "ride _____" in a crash. Since _____ keep you firmly behind _____ wheel, seat belts give _____ better control in an _____ and can also prevent _____ accidents.

[1521]

EXITING FROM A FREEWAY

How to Exit

There are usually three parts to _____ freeway exit:

1. a deceleration _____
2. an exit ramp
3. a _____ point

The deceleration lane _____ an extra lane for _____ cars. It leads them _____ of the main flow _____ traffic so they can _____ down safely. The exit _____ connects the freeway to _____ lower-speed roadway. The junction _____ is a stop or _____ sign or traffic signal _____ allows drivers to join _____ traffic safely.

To leave _____ freeway, do the following:

1. _____ half a kilometre before _____ exit, signal and prepare _____ move into the deceleration _____. However, do not start _____ slow down until you _____ in the deceleration lane _____.
2. Once you are in _____ deceleration lane, slow down _____ to the speed shown _____ the speed advisory signs. _____ your speed and steering _____ suit the curve. Look _____ far ahead around the _____ as you possibly can. _____ courteous. Often you don't _____ how fast you are _____ going because you've been _____ to the fast freeway _____. Check your speedometer.
3. Be _____ to stop at the _____ of the exit ramp. _____ will usually be a _____ sign or traffic light. _____ out for other traffic.

[1531]

AVOIDING REAR-END COLLISION

Usually the driver behind is considered _____ fault in a rear-end _____. However, you can still _____ your share to avoid _____ hit from behind. For _____, you can:

1. Communicate early. _____ you intend to slow _____, warn following drivers well _____ advance. Flash your brake _____. If you plan to _____ lanes, signal that intention _____ too. If someone ahead _____ you is making a _____ change, move over a _____ so the driver behind _____ see the signal as _____.

2. Remember to maintain a _____ cushion around your car.

3. _____ slow down gradually if _____ can. Don't brake suddenly.

4. _____ changing lanes, look over _____ shoulder. There may be _____ driver in your blind _____. You may never see _____ car if you just _____ on your mirrors.

5. Always _____ ahead. Be ready to _____ quickly and correctly if _____ emergency does arise.

POOR

QUALITY

ORIGINAL